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EXAMINER	
ZHONG, JUN FEI	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/800,397	SHARMA, ALOK	
	Examiner	**Art Unit**	
	JUN FEI ZHONG	2426	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _01 May 2009_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1,3-10,12-17 and 22-40_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1,3-10,12-17 and 22-40_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _06 August 2008_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _7/20/2009_.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to an AMENDMENT entered 5/1/2009.

2. The Non-Final Office Action of 2/17/2009 is fully incorporated into this Final Office Action by reference.

Status of Claims

3. Claims 1, 3-10, 12-17 and 22-40 are pending.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3-4, 8, 16-17, 22-26 and 36-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barham et al. (Patent # US 6721371 B1) in view of Yasuda (Patent # US 6466913).

As to claim 1, Barham discloses a method for provisioning multiple digital receivers, comprising:

providing an analog to digital converter (e.g., analog to digital converter 102; Fig. 18) having an analog input and a digital output (see col. 3, lines 50-56);

providing a plurality of digital receivers (e.g., demodulators 10; Fig. 18), each receiver having a programmable center frequency (e.g., reconfigurable FIR filter center frequencies) (see col. 6, lines 56-63),

where the plurality of digital receivers are to receive digitized samples from the analog to digital converter and where each of the plurality of digital receivers includes a low-pass digital filter (e.g., the digitized samples are coupled to each demodulators 10 through demultiplexer 103; each demodulator 10 includes reconfigurable FIR filter 14; Fig. 1b, 18) (see col. 5, lines 49-60; col. 6, lines 56-63);

each set corresponding to one of the plurality of low-pass digital filters (i.e., there are multiple demodulators 10 in Fig. 18, and each demodulator 10 has a reconfigurable FIR filter 14 in Fig. 1b. The system Barham discloses inherently has a set of coefficients for an FIR filter; different sets of coefficients would load into the FIR filter in order to change the characteristic of the FIR filter (reconfigurable). Therefore, the system Barham discloses inherently has multiple sets of coefficients, and each set corresponding to one FIR filter), each filter having one of a predetermined set of bandwidths (e.g., each FIR filter has a preset bandwidth for filtering signals) (see col. 3, line 43 through col. 6, line 63);

receiving a request to provision a selected one of the plurality of digital receivers (e.g., receive pointer information; pointer 124 points to a demodulator) (see col. 4, line 58-col. 5, line 9; Fig. 19);

Barham discloses memory for storing (see abstract; col. 4, lines 45-50)

Barham does not specifically disclose maintaining filter coefficients in storage.

In an analogues art, Yasuda discloses maintaining pre-computed sets of filter coefficients in non-volatile storage (e.g., coefficient ROM 202, 302; Fig. 3, 4) (see col. 5, lines 39-42; col. 6, lines 52-62; col. 16, lines 9-21),

selecting a first center frequency and a first bandpass bandwidth for provisioning the selected one of the plurality of demodulators digital receivers (e.g., CPU 301 selects coefficients to transmit to each FIR filter 312a, 312b, 322a, 322b; Fig. 4; i.e., when a set of coefficients is selected for an FIR filter, the transfer function of the FIR filter is set, and the center frequency and bandpass bandwidth are known based on the calculation) (col. 7, lines 1-9);

retrieving the filter coefficients associated with the first bandpass bandwidth (e.g., CPU 301 transmits coefficients to each FIR filter 312a, 312b, 322a, 322b; Fig. 4) (see col. 7, lines 1-9, 50-67);

subjecting the retrieved filter coefficients to a bandpass transformation corresponding to the first center frequency (e.g., CPU 301 controls the coefficients transmission and optimum parameter calculating unit 36 calculates optimum filter parameter) (see col. 7, lines 1-9, 50-67; col. 8, lines 1-18; col. 10, lines 28-47; col. 11, lines 22-41);

loading the transformed filter coefficients into coefficient latches in the selected one of the plurality of digital receivers (e.g., loading a set of coefficients to FIR filter buffer; Fig. 4) (see col. 7, lines 1-9, 50-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coefficients storage as taught by Yasuda to the

FIR filter of Barham in order to provide an FIR filter that is capable filtering variety of frequency ranges by change the coefficients, without change the hardware.

As to claim 3, Barham discloses the method of claim 1, further including:

reconfigurable FIR filter (see col. 4, line 11 through col. 6, line 63);

Yasuda discloses operating the selected one of the plurality of digital receivers at the first center frequency (e.g., CPU 301 selects coefficients for each FIR filter 312a, 312b, 322a, 322b; Fig. 4) (col. 7, lines 1-9);

subsequent to said operating, loading the coefficient latches in the selected one of the plurality of digital receivers with transformed coefficients corresponding to a second center frequency (e.g., CPU 301 selects different coefficient set to each FIR filter 312a, 312b, 322a, 322b; Fig. 4) (see col. 6, lines 52-62; col. 7, lines 1-9); and

operating the selected one of the plurality of digital receivers at the second center frequency (e.g., loading modified FIR coefficients to FIR filter buffer) (see col. 7, lines 1-9).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coefficients storage as taught by Yasuda to the FIR filter of Barham in order to provide an FIR filter that is capable filtering variety of frequency ranges by change the coefficients, without change the hardware.

As to claim 4, Barham discloses the method of claim 3, further including:

Multiple reconfigurable FIR filters (i.e., there are multiple demodulators 10 in Fig. 18, and each demodulator 10 has a reconfigurable FIR filter 14 in Fig. 1b, different sets of coefficients would load into the FIR filter in order to change the characteristic of the FIR filter (reconfigurable). Therefore, the system Barham discloses inherently has multiple sets of coefficients, and each set corresponding to one FIR filter) (see col. 4, line 11 through col. 6, line 63);

Yasuda discloses selecting a center frequency and a bandpass bandwidth for provisioning a second one of the plurality of digital receivers, wherein said first and second bandpass bandwidths are unequal (e.g., different sets of FIR coefficients are representing different bandpass bandwidths);

retrieving the filter coefficients associated with the bandwidth;

subjecting the retrieved filter coefficients to a bandpass transformation corresponding to the center frequency (e.g., CPU 301 controls the coefficients transmission and optimum parameter calculating unit 36 calculates optimum filter parameter) (see col. 7, lines 1-9, 50-67; col. 8, lines 1-18; col. 11, lines 22-41); and

loading the transformed coefficients into coefficient latches in the second one of the plurality of digital receivers (e.g., loading modified FIR coefficients to FIR filter buffer) (see col. 7, lines 1-9).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coefficients storage as taught by Yasuda to the FIR filter of Barham in order to provide an FIR filter that is capable filtering variety of frequency ranges by change the coefficients, without change the hardware.

As to claim 8, Barham discloses the method of claim 1, wherein the analog to digital converter, the plurality of digital receivers, and storage (e.g., registers or memory) are implemented on a single integrated circuit (e.g., bank or array of IC demodulators 10) (see col. 3, lines 53-55; col. 4, lines 45-50; col. 5, lines 49-57).

Yasuda discloses non-volatile storage (e.g., ROM 202, 302; Fig. 4)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coefficients storage as taught by Yasuda to the FIR filter of Barham in order to provide an FIR filter that is capable filtering variety of frequency ranges by change the coefficients, without change the hardware.

As to claim 16, Barham discloses the method of claim 1, wherein each of the plurality of digital receivers includes a finite impulse response (FIR) digital filter (see col. 3, lines 51-55; col.5, lines 49-52).

As to claim 17, the method of claim 16, wherein one or more of said FIR digital filters is an Optimum Equiripple Linear-Phase filter (i.e., this is a matter of design choice as known to those ordinary skill in the art of filter design).

As to claims 22-23, the claimed number of the filter coefficients for each filter is at least 16 (claim 22) and is at most 24 (claim 23) is also a matter of design choice, which is well known to those of ordinary skill in the art of filter design, in addition to, as is well

known in the art, tradeoffs must be made between passband ripple (less is better), stopband attenuation (more is better), for a fixed number of coefficients. Therefore, the number of coefficients selected by the inventor or designer is relative to the type of tradeoff benefits the designer would like to gain or lose as described above.

As to claims 24-26 and 36-40, the claims are met by the rejection of claims 1, 3-4, 8, 16-17 and 22-23, as described above

6. Claims 5-7, 13, 27-29 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barham et al. (Patent # US 6721371 B1) in view of Yasuda (Patent # US 6466913), and further in view of Quigley et al. (Patent # US 6650624).

As to claim 5, note the discussion above, Barham discloses a high speed demodulator system (see col. 4, line 11 through col. 6, line 63).

Both Barham and Yasuda fail to disclose CMTS.

Quigley discloses a CMTS channel bank organized into upstream and downstream channels (e.g., a plurality of demodulators 700a-700n, which receives modulated data input from a plurality of cable modems via a common transmission medium. The demodulators 700a-700n provide a demodulated data output for the frequency division multiplexed (FDM) upstream channels via which data is transmitted from the plurality of cable modems to the CMTS) (see col. 37, lines 29-45; Fig. 26).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the CMTS as taught by Quigley to the FIR filter of Barham as modified by Yasuda in order to enhance the data rate and/or reliability of upstream communications (see col. 3 lines 29-32).

As to claim 6, the claimed ratio of the number of upstream channels demodulated by the CMTS channel bank to a number of upstream input connectors of the CMTS channel bank is M (i.e., this is a matter of design choice as appreciated by one of ordinary skill in the art in the design of CMTS architecture).

As to claim 7, the claimed method of claim 6, wherein M is 16 is rejected on the same grounds as claim 6, since the claim has similar scope as claim 6.

As to claim 13, the claimed CMTS is DOCSIS compatible (i.e., it is well known in the art of cable modem technology that a CMTS is DOCSIS compatible).

As to claims 27-29 and 33, the claims are met by the rejection of claims 5-7 and 13, as described above.

7. Claims 14-15 and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barham et al. (Patent # US 6721371 B1) in view of Yasuda (Patent #

US 6466913), further in view of Quigley et al. (Patent # US 6650624), and further in view of Peyrovian (Patent # US 768682).

As to claim 14, note the discussion above, Barham discloses a high speed demodulator system (see col. 4, line 11 through col. 6, line 63).

Barham, Yasuda and Quigley fail to disclose upstream channels are in the 750-1000 MHz, which is well known to those of ordinary skill in the art of transmitting data over cable service.

Peyrovian discloses the upstream channels are in the 750- 1000 MHz portion of the spectrum (see col. 3, lines 38-53)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the 750-1000 MHz portion of the spectrum as taught by Peyrovian to the FIR filter of Barham as modified by Yasuda and Quigley because the high frequency band is typically much less susceptible to noise than the low frequency band that has traditionally been employed to carry the upstream information. Further, the frequency band of 750-1000 MHz has a much greater bandwidth than the low frequency band (see col. 3 lines 38-53).

As to claim 15, regarding the claimed at least one frequency stacker is used to densely pack each sub-band of the 750-1000 MHz spectrum portion (Official Notice is taking that it is well known in the art of data transmission over cable service to densely pack each sub-band of a given radio frequency (RF) spectrum portion (i.e. 750-1000

MHz) using at least one frequency stacker, for the advantage of efficiently using each sub-band in the given frequency spectrum so that the maximum amount of sub-bands in the spectrum may be used for sending data over the cable line. Therefore, it is submitted that it would have been clearly obvious to one of ordinary skill in the art at the time of the invention to have used at least one frequency stacker to densely pack each sub-band of the 750-1000 MHz spectrum portion for the advantage given above).

As to claims 34-35, the claims are met by the rejection of claims 14-15, as described above.

8. Claims 9-10, 12, and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barham et al. (Patent # US 6721371 B1) in view of Yasuda (Patent # US 6466913), further in view of Quigley et al. (Patent # US 6650624), and in further view of the Applicant's admitted prior art in Fig. 17(A).

As to claim 9, note the discussion above, Barham, Yasuda and Quigley do not specifically disclose the claimed CMTS channel bank is organized using a plurality of modules, each module having a plurality of downstream channels and a plurality of upstream channels.

The claimed CMTS channel bank is organized using a plurality of modules, each module having a plurality of downstream channels and a plurality of upstream channels is met by the admitted prior art Fig. 17(A), that discloses a CMTS channel bank with a

module of downstream connectors for channels and 16 upstream connectors for channels and there are 8 modules in the bank, which directly corresponds to the claimed features.

Therefore, it is submitted that it would have been clearly obvious to one of ordinary skill in the art at the time of the invention to have using a plurality of modules, each module having a plurality of downstream channels and a plurality of upstream channels for the benefits of supporting multiple communication channels in both direction at the same time. Thus, the claimed features are not patentable in view of the disclosure of the admitted prior art.

As to claim 10, note the discussion above, Barham, Yasuda and Quigley do not specifically disclose the number of the upstream channels is 4 times a number of the downstream channels

The claimed number of the upstream channels is 4 times a number of the downstream channels is met by admitted prior art Fig. 17(A), that discloses a CMTS channel bank with a module of 16 upstream connectors for channels and 4 downstream connectors for channels and there are 8 modules in the bank, which directly corresponds to the claimed features.

Therefore, it is submitted that it would have been clearly obvious to one of ordinary skill in the art at the time of the invention to have using upstream channels is 4 times a number of the downstream channels for the benefits of optimize multiple

channels communication. Thus, the claimed features are not patentable in view of the disclosure of the admitted prior art.

As to claim 12, note the discussion above, Barham, Yasuda and Quigley do not specifically disclose the CMTS channel bank has 4 times as many upstream channels as downstream channels.

The claimed CMTS channel bank has 4 times as many upstream channels as downstream channels is met by admitted prior art Fig. 17(A), that discloses a 32 downstream by 128 upstream CMTS channel bank, which directly corresponds to the claimed feature.

Therefore, it is submitted that it would have been clearly obvious to one of ordinary skill in the art at the time of the invention to have using upstream channels is 4 times a number of the downstream channels for the benefits of optimize multiple channels communication. Thus, the claimed features are not patentable in view of the disclosure of the admitted prior art.

As to claims 30-32, the claims are met by the rejection of claims 9-10 and 12, as described above.

Response to Arguments

9. Applicant's arguments filed 5/1/2009 have been fully considered but they are not persuasive.

As to claim 1, applicant argues BARHAM et al. and YASUDA et al. do not disclose or suggest subjecting the retrieved filter coefficients to a bandpass transformation corresponding to the first center frequency.

However, the examiner respectfully disagrees. Yasuda clearly discloses "*The CPU 31 reads one of the sets of initial parameters from the initial parameter memory 35 in accordance with the localization shift signal, and transmits the initial parameters to the optimum parameter calculating unit 36. <u>The optimum parameter calculating unit 36 calculates an optimum filter parameter based on the initial parameters transmitted by the CPU 31</u>. The filter coefficient determining unit 37 determines filter coefficients of each of the S/L filter 12 and the S/L filter 22 based on the optimum filter parameter supplied by the optimum parameter calculating unit 36. The CPU 31 controls the filter coefficient determining unit 37 such that the determined filter coefficients are supplied from the filter coefficient determining unit 37 to each of the coefficient buffer 13 and the coefficient buffer 23.*" Therefore, Yasuda discloses the claimed limitation subjecting the retrieved filter coefficients to a bandpass transformation corresponding to the first center frequency (see col. 7, lines 1-9, 50-67; col. 8, lines 1-18; col. 10, lines 28-47; col. 11, lines 22-41) (also see chapter 5 of "Digital Signal processing Communication Systems" by Marvin Frerking, pages 152-209);

As to claim 8, applicant argues BARHAM et al. does not disclose the analog to digital converter, the plurality of digital receivers, and the non-volatile storage are implemented on a single integrated circuit.

First, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Secondly, Barham discloses the analog to digital converter, the plurality of digital receivers, and the storage (e.g., registers or memory) are implemented on a single integrated circuit (e.g., bank or array of IC demodulators 10) (see col. 3, lines 53-55; col. 4, lines 45-50; col. 5, lines 49-57). However, Barham is silent about the storage be non-volatile storage. And Yasuda discloses non-volatile storage (e.g., ROM 202, 302; Fig. 4). Therefore, the combination of Barham and Yasuda disclose the claimed limitation.

Claims 3-7, 9-10, 12-17 and 22-40 recites similar features or depends on claim1, they are rejected at least for the same reason as to claim 1.

Conclusion

10. Claims 1, 3-10, 12-17 and 22-40 are rejected.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Rambaud et al. (Patent # US 6980592) is cited to teach storing filter coefficients in volatile or non-volatile memory.

Webb (Patent # US 6427157) is cited to teach storing sets of filter coefficients in memory.

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUN FEI ZHONG whose telephone number is (571)270-1708. The examiner can normally be reached on M-F, 7:30~5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Hirl can be reached on 571-272-3685. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JFZ
7/27/2009

/Joseph P. Hirl/
Supervisory Patent Examiner, Art Unit 2426
July 29, 2009